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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 02/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/826,730

Applicant(s)

BEAUCHAINE ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 12-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-21 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 04/04.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-11, drawn to apparatus, classified in class 118, subclass 728.
- II. Claims 12-21, drawn to method for assembly of apparatus, classified in class 29, sub-class 25.01.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as apparatus and process for assembly of apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus does not specify deposition steps to be done whereas method includes deposition steps and thus apparatus could be made by a process not requiring deposition steps. Furthermore the apparatus specifies the first layer to have greater purity than the boat whereas method for assembly of apparatus (invention of Group II) does not specify any such condition and thus apparatus could be used to practice a materially different process.

Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

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During a telephone conversation with Guy R Gosnell on 02/13/06 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-11. Affirmation of this election must be made by applicant in replying to this Office action. Claims 12-21 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Thilderkvist et al (US patent No. 6,277, 194), Claim 3 is rejected as being anticipated by

Thilderkvist (US Patent No. 6, 277, 194) and as evidenced by Nakashima et al (US PG PUB No. 2003/0170583) and Google search dated 02/20/06

<http://www.google.com/search?hl=en&q=hardness+and+polysilicon&btnG=Google+Search>, and Claim 4 is rejected as being anticipated by Thilderkvist et al (US

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Patent No. 6,277,194) and as evidenced by Hamaguchi et al (US Patent No. 6,660,093) and Irissou (US Patent No. 6,027,956).

Regarding Claim 1: Thilderkvist et al teach an apparatus (Figure 4) that includes a susceptor (support fixture/boat) 120 for holding at least one wafer 118 comprising:
of graphite material;

a silicon carbide film (first layer) coated on the susceptor (boat); and

a polysilicon (second layer) film on top of silicon carbide layer {[Figures 5-9 and Column 6, lines 20-60 and Column 9, line 5 to Column 10, line 50]}.

Regarding Claims 3: Thilderkvist et al teaches all limitations of the claims including that boat is made of graphite and is coated with silicon carbide (first layer) and polysilicon (second layer).

Further, Nakashima et al teach (provide evidence) an apparatus (Figure 2) that includes a reaction furnace 40 with a substrate support device 30 and where the hardness of materials used is as follows:

wafer (silicon) :1000-1050 kgf/mm² (Vickers) and support (graphite) – 200-250 kgf/mm² (Paragraphs 0012, Table 1).

Further as per Google search of www.memsnet.org/material/polysiliconfilm the hardness of polysilicon film is between 10.5 Gpa – 1.5 Gpa (1071-1173 kgf/mm²). Thus hardness of polysilicon (second layer) more closely matches a hardness of the at least one wafer than a hardness of said boat (graphite).

Regarding Claim 4: As regards thermal coefficient of expansion Thilderkvist et al teach all limitations of the claims including that boat is made of graphite (one of graphite or

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silicon carbide) and is coated with silicon carbide (first layer) and polysilicon (second layer).

Further Hamaguchi et al teach (provide evidence) that coefficient of thermal expansion of polysilicon greatly differs from that of silicon carbide (Column 3, lines 35-40).

Additionally, Irissou teaches in connection with a method for manufacture of photodiode (Figure 3F) that polysilicon layer 321 has a thermal coefficient of expansion that is approximately same as thermal coefficient of expansion of silicon wafers 312, 330 (Column 6, lines 20-30).

Thus Hamaguchi et al and Irissou provide evidence that thermal coefficient of expansion of polysilicon (second layer) more closely matches a coefficient of thermal expansion of wafer than a coefficient of thermal expansion of said silicon carbide (boat material).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not

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commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thilderkvist (US patent No. 6,277, 194) in view of Boyle et al (US Patent No. 6,450,346).

Regarding Claim 2: Thilderkvist et al teach all limitations of the claim except that first layer has greater purity than the boat.

Boyle et al teach an apparatus (support fixture) for holding at least one wafer comprising a boat (Figure 2) comprised of silicon carbide material; a first layer on at least a portion of said boat and comprised of silicon carbide (Column 2, lines 10-20). Boyle et al also teach that boat material (sintered silicon carbide) is contaminated with metals and is therefore coated with a thin layer of silicon carbide that is much cleaner (purer) {Column 2, lines 10-20}.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to form pure silicon carbide film over the surface of as taught by Boyle et al in the apparatus of Thilderkvist et al to minimize contamination of wafer.

Regarding Claim 6: Thilderkvist et al in view of Boyle et al teach that first and second layers are formed by chemical vapor deposition layers (Thilderkvist et al – Column 3, lines 55-65, and Boyle et al – Column 2, lines 10-20). Further claim 6 is product by process claim.

In this regard courts have ruled (Case law):

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“Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)”.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Thilderkvist et al (US Patent No. 6,277,194) in view of Ishii et al (US Patent No. 5,820,683).

Regarding Claim 5: Thilderkvist et al teach all limitations of the claim except that first layer completely surrounds the boat.

Ishii et al teach an apparatus (Figure 1) that includes a wafer boat 11 made of silicon carbide and whole body (film surrounds the boat) is then coated with a silicon carbide film [Column 4, lines 55-65].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to apply silicon carbide film over whole body of boat as taught by Ishii et al in the apparatus of Boyle et al to bury porous surface created by cutting process during manufacture of boat (Column 4, lines 55-65).

Claims 7, 8, 9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thilderkvist (US patent No. 6,277, 194) in view of Boyle et al (US Patent No. 6,450,346) [as per evidence by Nakashima et al (US PG PUB No. 2003/0170583) and Google search dated 02/20/06

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<http://www.google.com/search?hl=en&q=hardness+and+polysilicon&btnG=Google+Search>]

Regarding Claims 7, 9: Thilderkvist et al in view of Boyle et al teach all limitations of claim as explained above including that boat has first and second layers of films, where first layer has greater purity than boat and where second layer is formed of polysilicon (different material than first layer and boat) {[Figures 5-9 and Column 6, lines 20-60 and Column 9, line 5 to Column 10, line 50}.

Thilderkvist et al in view of Boyle et al do not teach that second layer has at least one material property selected from the group consisting of: (i) a hardness that more closely matches a hardness of the at least one wafer than a hardness of said boat, and (ii) a coefficient of thermal expansion that more closely matches a coefficient of thermal expansion of the at least one wafer than a coefficient of thermal expansion of said boat.

Nakashima et al teach an apparatus (Figure 2) that includes a reaction furnace 40 with a substrate support device 30 and where the hardness of materials used is as follows: wafer (silicon) – 1000-1050 kgf/mm² (Vickers) and support (graphite) – 200-250 kgf/mm² (Paragraphs 0012, Table 1).

Further as per Google search of www.memsnet.org/material/polysiliconfilm the hardness of polysilicon film is between 10.5 Gpa – 1.5 Gpa (1071-1173 kgf/mm²). Thus hardness of polysilicon (second layer) more closely matches a hardness of the at least one wafer than a hardness of said boat (graphite).

Regarding Claim 8: Boyle et al teach that first layer and boat are formed of silicon carbide (Column 2, lines 10-20).

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Regarding Claim 11: Thilderkvist et al in view of Boyle et al teach that first and second layers are formed by chemical vapor deposition layers (Thilderkvist et al – Column 3, lines 55-65, and Boyle et al – Column 2, lines 10-20). Further claim 6 is product by process claim.

In this regard courts have ruled (Case law):

“Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)”.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Thilderkvist et al (US Patent No. 6,277,194) in view of Boyle et al (US Patent No. 6,450,346) [as evidenced by Nakashima et al (US PG PUB No. 2003/0170583) and Google search dated 02/20/06

<http://www.google.com/search?hl=en&q=hardness+and+polysilicon&btnG=Google+Search>] as applied to Claim 7 and further in view of Ishii et al (US Patent No. 5,820,683).

Regarding Claim 10: Thilderkvist et al in view of Boyle et al teach all limitations of the claim except that first layer completely surrounds the boat.

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Ishii et al teach an apparatus (Figure 1) that includes a wafer boat 11 made of silicon carbide and whole body (film surrounds the boat) is then coated with a silicon carbide film [Column 4, lines 55-65].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to apply silicon carbide film over whole body of boat as taught by Ishii et al in the apparatus of Thilderkvist et al in view of Boyle et al (and as evidenced by Nakashima et al (US PG PUB No. 2003/0170583) and Google search (dated 02/20/06) to bury porous surface created by cutting process during manufacture of boat (Column 4, lines 55-65).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh Dhingra



Parviz Hassanzadeh
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Art Unit 1763